that the psychological explanation of this phenomenon lies in the possession by these ruling classes of practically unrestrained power, which has caused them to adopt methods of cruelty.

This system of military domination, being inherently unstable, ultimately began to break down, and the peoples of Western Europe, released to some extent from the restraints imposed on mankind for so long by their ruling classes, were enabled to begin once more that progressive conquest of Nature which has so often and so rudely been interrupted in the past.

Obituary.

We record with much regret the death of Dr. W. Ironside Bruce on March 21 at the early age of forty-four. Dr. Bruce was educated at the University of Aberdeen, obtaining the degrees of M.B. and Ch.B. in 1900, and then served as civil surgeon in the South African Field Force. Here he took much interest in the application of X-rays for the diagnosis of war injuries, and afterwards became assistant to the late Sir J. Mackenzie Davidson at Charing Cross Hospital, and on the death of the latter succeeded as medical officer in charge of the X-ray department. Dr. Bruce was intensely interested in the scientific developments of his subject, of which he acquired a very complete knowledge. He published "A System of Radiography with Atlas of the Normal," and in process of time became president of the section of radiology, Royal Society of Medicine, and took a considerable share in the establishment of the diploma in radiology, now given by the University of Cambridge. Some months ago the condition of his health gave rise to anxiety, and it was later found that he was suffering from a severe type of aplastic anæmia, from which he died. Evidence has accumulated that this condition may be caused by the more penetrating radiations both from X-ray tubes and from radium, and there is little doubt that he succumbed as a result of his continuous work in radiology—another X-ray worker who may be described as a martyr to his science.

Lord Lonsdale has received the following letter from Buckingham Palace: "The King has learnt with much regret of the tragic death of Dr. Ironside Bruce, radiologist to the Charing Cross Hospital, and I am commanded to convey to you and the hospital staff his Majesty's sincere sympathy in the loss of so brilliant a physician, who sacrificed his life in the cause of science and humanity."

Science and industry alike have suffered a loss by the recent death, at Southall, of Mr. S. H. Blichfeldt, a director of the Maypole Margarine Co. Mr. Blichfeldt was only forty-four years of age. He was of Danish birth, and took up a position as chemist at the Maypole works at Southall in 1906 after having worked for some years at Jörgensen's laboratory in Copenhagen. He was a strong advocate of the application of science to industry, and throughout his work demonstrated the importance of scientific methods in the factory, and the manufacture of margarine in the Maypole Co.'s works was gradually placed upon a really scientific basis as the result of his labours. Mr. Blichfeldt's abilities as a chemist and bacteriologist were widely known to the scientific world, and it is pleasing to note that the Maypole Co. recognised the value of research in industry, and appointed him a director of the company in 1916.

Science for March 11 announces the death on February 2 of Prof. T. Miyake, of the Agricultural College of the Imperial University of Tokyo, who was the author of an important work on the entomology of Japan; and on February 24 of Dr. F. J. V. Skiff, director of the Field Museum, at the age of sixty-nine years.

The death is announced, at eighty-three years of age, of Mr. John Burroughs, the inspiring American writer on natural history subjects.

Notes.

Lecturing before the Royal Society of Medicine on March 22, Lt.-Col. Nathan Raw gave an account of his work and views on immunity in human tuberculosis. Col. Raw agrees with other investigators that man is attacked by two fundamentally different tuberculous viruses, the human and the bovine. The former is conveyed from person to person by direct infection and mainly attacks the lungs; the other is conveyed by milk from tuberculous cows and develops in the first few years of life. These two types of tubercle bacilli will not live in the body at the same time, and, further, an attack by one virus produces an immunity to the other. The bacilli may be attenuated by cultivating for years outside the body, so that they no longer convey the disease on inoculation into susceptible animals. Vaccines can be prepared from these attenuated cultures, and may be employed for the treatment of tuberculosis in man. Cases of infection with the human bacillus treated with the vaccine of the bovine virus have shown considerable improvement. Animals may be completely immunised against tuberculosis by the use of these attenuated cultures, and Col. Raw expressed the opinion that if all children with a tuberculous family history were vaccinated with the attenuated cultures, an entirely safe procedure, they would be in a much better position to resist infection in after years.

No section of scientific medicine has developed more rapidly in technique than those dealing with vaccines, sera, toxins, antitoxins, and related substances. The real science of these "biologic products" is scarcely a generation old. The use of them in medical practice has spread in recent years with an epidemic acceleration. Vaccines are not yet quite so commonly used as, say, digitalis or strychnine, but they are among the approved medicaments of the "general practitioner." The same is more or less true of salvarsan and its substitutes. The great drug firms have risen to the demand, and the whole medical position is now such that the public service has found it necessary to consider how the best and safest products shall be secured to the consumer. It is these facts that led to the appointment of the Committee "on control of certain therapeutic substances," with Sir Mackenzie Chalmers, K.C.B., as chairman. The terms of reference covered "the legislative and administrative measures to be taken for the effective control of the quality and authenticity of such therapeutic substances offered for sale to the public as cannot be tested adequately by direct chemical means." This carefully exclusive remit left the Committee to deal with three groups of substances: (1) the biologic products already mentioned; (2) potent synthetic remedies like salvarsan; and (3) preparations like digitalis, strophanthus, pituitary gland, etc. The report (Cmd. 1156, *2d.*) deals with all three classes. It makes special recommendations for inspection of the processes of manufacture and testing of the products. The main problem is standardisation. This is supremely difficult for delicately varying biological substances like vaccines or toxins. Recommendations, however, make full provision for the activities of private enterprise. There is an outline of a draft Bill, which no doubt is prepared first for discussion. From the evidence quoted the leading British firms are in favour of more effective control.

IT is reported from Rome that a "thunderbolt" fell there on Sunday, March 27, and slightly damaged the base of the Obelisk in the Piazza di San Pietro, but no mention is made of any fragments of the meteorite having been found. The excellent "Introduction to the Study of Meteorites," published by the British Museum (Natural History), refers as follows to several early historical accounts of meteorites associated with Rome:—"A stone, famous through long ages, fell in Phrygia, and was preserved there for many generations. About 204 B.C. it was demanded by King Attalus, and taken with great ceremony to Rome. It is described as 'a black stone in the figure of a cone, circular below and ending in an apex above.' In his History of Rome Livy tells of a shower of stones on the Alban Mount about 652 B.C. which so impressed the Senate that a nine days' solemn festival was decreed. Other instances of the 'rain of stones' in Italy are mentioned by the same author."

THE next ordinary scientific meeting of the Chemical Society will be held at the Institution of Mechanical Engineers on April 7 at 8 p.m., when Dr. F. W. Aston will deliver a lecture entitled "Mass Spectra and Atomic Weights."

IN connection with the London Branch of the National Union of Scientific Workers a meeting will be held at 7.30 o'clock on Thursday, April 14, at 52 St. Martin's Lane, W.C.2, when an address will be given by Mr. H. E. Potts on "The Position of Employer and Scientific Worker in Relation to Patent Law."

ON Tuesday next, April 5, at 3 o'clock, Prof. R. A. Sampson, Astronomer-Royal for Scotland, will deliver the first of two lectures at the Royal Institution on (1) Present Position of the Nebular Hypothesis and (2) Measurement of Starlight. The Tyndall lectures will be delivered by Mr. C. T. R. Wilson on Thunderstorms, beginning on Thursday, April 7; and on Saturday, April 9, Dr. H. H. Dale begins a course of two lectures on Poisons and Antidotes. The Friday evening discourse on April 8 will be delivered by Dr. R. H. A. Plimmer on Quality of Protein in Nutrition.

THE officers elected by the Institution of Petroleum Technologists for the session 1921–22 are as follows:—*President:* Prof. J. S. S. Brame. *Vice-Presidents:* Mr. H. Barringer, Sir George Beilby, Sir John Cargill, Bart., the Right Hon. Viscount Cowdray of Cowdray, Mr. A. W. Eastlake, and Sir Thomas H. Holland. *Council:* Mr. A. C. Adams, Mr. H. Allen, Major R. W. Barnett, M.P., Mr. A. Campbell, Mr. E. H. Cunningham Craig, Mr. A. Duckham, Dr. A. E. Dunstan, Mr. J. Kewley, Dr. W. R. Ormandy, Mr. T. C. Palmer, Dr. F. Mollwo Perkin, Mr. R. Redwood, Mr. J. S. Smith, and Prof. W. W. Watts.

THE Joint Committee on British Petrographic Nomenclature appointed by the Geological Society of London and the Mineralogical Society has published a report in the current issue of the *Mineralogical Magazine.* The report deals with ninety rock-names hitherto used with various meanings. Some synonymous terms are considered and seven general recommendations for the formation of rock-names are made. The Geological Society has issued one copy of the report to each of its fellows. A limited number of copies are still available for distribution. Application for copies may be made to Mr. Campbell Smith, British Museum (Natural History), Cromwell Road, S.W.7. The committee is still in being, and it is expected that further meetings will be held.

WE have received the first issue of *Atti della Società Agronomica Italiana,* the purpose of which is to co-ordinate and initiate scientific work in agriculture in Italy, it being considered that the existing agencies are not sufficiently strong. An advisory committee has therefore been formed under the presidency of Senator Grassi, and including Profs. Baglioni, Bonzi, Cuboni, and Pirotta. A programme has been drawn up comprising five sections:—(1) Investigations of the best means of utilising poor and arid land, special attention being paid to the phenomena of drought resistance of crops. (2) The study of the yield capacity of wheat in the south of Italy, especially in relation to the physical features of the country and the meteorological data. (3) The control of the insect pests of the olive. (4) The possibility of obtaining potash manures from leucite deposits. (5) The study of the root-rot of the Sicilian citrus-tree. The new organisation will be watched with much interest by agriculturists everywhere, who will heartily wish it success in the study of these important problems.

DR. R. KARSTEN contributes to *Acta Academiae Aboensis,* part i., an elaborate monograph entitled "Contributions to the Sociology of the Indian Tribes of Ecuador," divided into three parts, dealing with agriculture, hunting and fishing, and birth customs respectively. The last includes an account of the magical practices intended to promote the growth of the crops and modes of attracting animals and fish. Many curious details are given regarding birth customs. These are closely connected with peculiar, but vague, ideas of conception and supernatural birth. They do not, like the Arunta of Australia, believe that conception is entirely due to spirit influence, but they think that the influence of the new moon is a potent cause. Monstrous or defective children are the direct result of demoniacal operation, and the same belief extends to the birth of twins, even where there is nothing abnormal in their outer appearance.

IF the theory explained in a paper entitled "Buddha's Diadem" by the eminent scholar Dr. L. A. Waddell, and published in *Ostasiatische Zeitschrift* (iii., 2), be accepted, the current views of the development of early Buddhism must be modified. The popular view is that the deification of Buddha, unknown to the orthodox primitive school, did not prevail among the "Northern" school until the age of Kanishka (1st century B.C. to 2nd century A.D.). It is now shown that as early as the 4th or 3rd century B.C. Buddha was invested with the attributes of the supreme Brahman god Náráyana—Vishnu. One of the two chief conventional symbols of this god was the supernatural diadem, now represented by the curious protuberance of the skull in images of Buddha, the prototype of which is the serpent-hood of Varuna, the Vedic god of the firmament. By the artists of the Gandhára school Buddha was identified with Apollo, and the skull protuberance became a symbol of divine wisdom, emitting flames which become divine messengers. It was at a later time conceived by Buddhists as the seat of the Dharani, or magical protective spells. In short, the diadem is the lineal descendant of a primeval cosmic ideograph imported into ancient India from the West long before the rise of Buddhism, expressing the divinity in Nature's order, or Law. The paper is attractively written, and forms an important contribution to the study of early Buddhism.

Two recently published maps show some important aspects of the distribution of population in Siberia. They accompany an article in *Petermanns Mitteilungen* for December, 1920, by Dr. A. Schultz entitled "Die Verteilung des Landbesitzes in Sibirien." Of most interest is the location of the colonies of free settlers from European Russia and the colonies of Cossacks. The maps show clearly the small hold in real settlement that Russia has on the rich lands of eastern Siberia, especially the Amur and Ussuri valleys. They illustrate also the strong predominance of Cossacks and native Siberiaks around the head-waters of the Amur system and Chita and Transbaikalia generally. In western Siberia Russian settlers predominate north of the steppe provinces and south of the marsh and forest lands. The statistics on which the maps are based date from 1913, or even earlier in some cases, but this is unavoidable; even under the old *régime* Russian statistics were very slow to appear, and now they are unobtainable.

IN an address on "International Organisation and Public Health," read before the Society of Medical Officers of Health on February 18, Dr. G. S. Buchanan reviewed the International Health Organisation which will shortly come into being as a result of a series of detailed resolutions which were passed by the Assembly of the League of Nations at Geneva last December (*Lancet,* February 26). By the Covenant of the League of Nations the members of the League pledge themselves to take steps in matters of international concern for the prevention and control of disease. These include (1) advising the League in matters affecting health, (2) co-ordination of administrative health authorities in different countries, (3) organisation of means for the more rapid interchange of information on matters such as epidemics where precautionary measures may be required, (4) the revision of international agreements affecting the public health, (5) assisting international labour organisations in securing protection for the worker against sickness, injury, and disease arising out of his employment, and (6) the organisation of missions in connection with matters of health at the request of the League of Nations.

WE have received a brochure entitled "Approved Technique of the Rideal-Walker Test," by Dr. S. Rideal and Mr. Ainslie Walker (H. K. Lewis and Co., 1*s*. net). It contains a clear and full account of this test, which is employed for estimating the germicidal value of disinfectants, comparing the particular disinfectant with a standard carbolic acid solution under stated conditions. The test was originally devised about 1902, and the present description introduces some modifications of detail, though not of principle. The term "approved" which appears in the title may mislead, as it here means "recommended by the authors," and not a statutory or general approval.

MR. HECTOR COLWELL continues his "History of Electrotherapy" in the *Archives of Radiology and Electrotherapy* for February (No. 247). The work of Duchenne (1806–75) particularly is dealt with. Duchenne was the first to discover that individual muscles can be stimulated electrically by the application of suitable moistened electrodes to the overlying skin, and he is regarded by Mr. Colwell as the founder of modern electro-therapeutics.

THE attention of workers on water-mites (Hydracarina) is directed to the account by Messrs. C. D. Soar and W. Williamson (Journal of the Quekett Microscopical Club, vol. xiv., November, 1920) of the twenty-two species of Eylais which occur in Britain.

MR. E. AVERY RICHMOND has published (Bull. Amer. Mus. Nat. Hist., vol. xlii., 1920) some interesting studies on the life-history and biology of water-beetles of the family Hydrophilidæ, especially on those occurring in the vicinity of Ithaca. Some eighteen genera—examples of all of which have been reared by the author—are dealt with, and keys are given for the determination of the egg-cases, larvæ, and pupæ (so far as they are known) of this family.

AMONG the investigations carried out at the Millport Marine Laboratory, which are recorded in the recently issued annual report for 1919 of the Scottish Marine Biological Association, is one by Mr. R. Elmhirst and Dr. J. H. Paul on the distribution of copper in the blood and "liver" of the Decapod Crustacea during the moulting cycle. It has been found that as moulting approaches the animal accumulates a considerable amount of copper in the "liver," and that this is released into the general circulation when the shell is cast. The amount of copper present varies; in the Macrura it may represent 5 per cent. of the ash of the liver; in the Brachyura only traces are present; in Lithodes—the position of which is regarded as intermediate—the maximum amount is about 2½ per cent. Mr. Elmhirst notes the great abundance in the Laminarian zone of the polyzoon *Membranipora membranacea,* and that animals of various phyla browse on Membranipora, *e.g.* sea-urchins, starfish and brittle stars, lobsters, crabs, and several molluscs, all of which require lime for building their skeletons or shells. Estimations by Mr. Elmhirst and Mr. J. S. Sharpe show that round the shores of Cumbrae the quantity of lime available in the Membranipora in August was equivalent to some 3½ tons of metallic calcium. At that season members of the larger crustacea moult inshore among the Laminaria, and it is significant also that analyses of the ash of Membranipora reveal traces of copper.

IN the Transactions of the New Zealand Institute (lii., pp. 193–239, 1920), Dr. J. E. Holloway continues his studies of the New Zealand species of the genus Lycopodium with an account of the structure of the prothallus in five species, belonging to the sections Phlegmaria and Cernua. The structure, which shows considerable variety, is described in detail, together with the relation of the young plant to the prothallus and the form and distribution of the symbiotic fungus which is universally present, at any rate in later stages of development. The author regards the fungal symbiont as of great importance. He concludes, from a comparative study of the general form and structure of the different Lycopodium prothalli, that they are all more or less modified from some primitive type of structure, and that the chief factor in this modification has been the presence of the symbiotic fungus. This primitive type was probably a bulky filament of radial build living at the surface of the ground and containing chlorophyll. The adoption of a fungal habit opened the door to possibilities of modification of this simple type of structure, and the prothallus was able to establish itself in new positions and soils, the different types of habitat resulting in different types of modification of the original structure. When the fungal habit was thoroughly adopted, the early filamentous stage became lost, but in all its forms the Lycopodium prothallus has never departed from its radial build. It is suggested as possible that the varied aspects of the genus as it exists to-day, in the form and structure of the mature plant, have arisen as a natural consequence from the spread of the prothallus to different stations and soils.

WE have received the annual report of the Director of the United States Geological Survey for the year ending June 30, 1918. During the year under review practically all the activities of the Survey were directed to the prosecution of the war and to problems arising from the war; research of a purely scientific nature was in abeyance. Much attention was devoted to the search for minerals, the examination of deposits, and the estimate of available reserves. In the effort to meet the urgent demand for essential minerals, Survey geologists visited not only the mining districts of the United States, but also deposits of potash, nitrate, chrome, and manganese in Central and South America and the West Indies. As a further contribution to the problems of the day, much consideration was paid to the extent to which water-power could, if necessary, replace steam-power. A natural extension of these investigations was the study of the mineral and power resources of the world in general. A number of ingenious diagrams show the work of the various departments of the Survey in relation to the War Departments to which they contributed.

SINCE the memorable work of J. W. Judd on the Mesozoic rocks of Scotland the Geological Survey has been able to add many important details, and the discovery of iron-ore in the Upper Lias of Raasay by H. B. Woodward in 1893 has led to a considerable industry. Dr. G. W. Lee now describes ("The Mesozoic Rocks of Applecross, Raasay, and North-East Skye," Mem. Geol. Surv. Scotland, 1920, 6*s.*) the western zones in detail, with an interesting series of comparative vertical sections and a geological map of the southern end of Raasay. The iron-ore is oolitic, and passes laterally into siderite. Its composition is held to ally it with chamosite, the green chloritic silicate described in 1820 from Chamoson, west of Sion, in the Rhône vale. Berthier's original analysis, it may be remarked, has been replaced by those of Groth, which bring the composition of chamosite into agreement with the ore of Raasay. Mr. S. S. Buckman concludes from the ammonite fauna that a long interval occurred between the deposition of the oolitic beds and the overlying shales, and Dr. Lee suggests that the mineral change in the former took place during this stratigraphical episode. The presence of green silicates in the oolitic iron-ores of Arenig age in North Wales, which have been ascribed to the alteration of limestone, renders further research into the origin of the Raasay ore desirable.

ALL previous attempts at tabulating chemical analyses of rocks are dwarfed by Professional Paper 99, 1917, United States Geological Survey ("Chemical Analyses of Igneous Rocks," by Dr. H. S. Washington). It is a revised and enlarged edition of Professional Paper 14 (1903), which contained 2881 analyses published between 1884 and 1900. The present volume contains 8602 analyses of igneous rocks published between 1884 and 1913, which have been carefully scrutinised and graded according to their completeness, accuracy, and the freshness of the material analysed. They are divided into four parts:—(1) Superior analyses of fresh rocks; (2) incomplete analyses of fresh rocks; (3) superior analyses of altered rocks and tuffs; and (4) inferior analyses. Part 1, including 4980 analyses, constitutes the most complete statement yet published of the distribution of rocks in the subdivisions of the quantitative classification of igneous rocks of Cross, Iddings, Pirsson, and Washington (1903), an explanation of which is given in appendix i. The analyses in the other three parts are arranged under their published rock-names. A valuable feature of the arrangement is the geographical grouping of analyses in each subdivision; this brings out the extreme scarcity of trustworthy analyses of rocks of some of the most important petrological areas. In this connection it may be noted that for rocks of the British Isles there are only 264 analyses recorded in the whole book, distributed as follows: 77 in part 1, 9 in part 2, 90 in part 3, and 88 "inferior" analyses in part 4. Dr. Washington's work will be of inestimable value. The complete record of analyses here presented and their arrangement by the quantitative system will facilitate the reviewing of our current nomenclature in the light of the chemical composition of rocks.

DR. C. E. ADAMS, Government Astronomer and Seismologist in New Zealand, and Prof. E. Marsden have recently visited the geophysical observatory at Apia founded in 1902 by the Society of Sciences of Göttingen. Their report appears in the *New Zealand Journal of Science and Technology* (vol. iii., 1920, pp. 157–61). The observatory is the most complete of its kind in the Pacific. The magnetic department provides for the continuous registration of the horizontal component, the vertical component, and the declination. The seismological observatory contains Wiechert seismographs for both horizontal and vertical components of the motion. A recording tide-gauge is maintained in the adjoining harbour. In addition to the usual astronomical and meteorological observations, arrangements have been made for the investigation of the upper atmosphere by means of hand-hauled kites and free balloons. New Zealand having accepted the mandate over Samoa, the authors urge the desirability, with which all will agree, of maintaining the observatory, which is well-equipped and situated, at its full pre-war efficiency.

ONE of the most serious difficulties with which inventors of apparatus for use on aeroplanes during the war had to contend was the absence of any information as to the special circumstances in which the apparatus had to operate and the arrangements which had been made to enable it to function properly in those circumstances. Even now it is not easy for an inventor not engaged in aeroplane construction or design to get to know what apparatus is actually used and in what respects it falls short of the requirements of the service. To all who are interested in the subject an article on aeronautical instruments in the January issue of the Journal of the Franklin Institute by Prof. C. E. Mendenhall will be welcome. It divides them into four groups concerned respectively with the engine, the aeroplane, navigation, and military purposes, and in each group the instruments used and the special difficulties with which they have to contend are described. The article is well illustrated, and gives much valuable information in a compact and readable form.

THE "British Meteorological and Magnetic Year Book," 1917, part 4, has recently been published by the Meteorological Office. It comprises hourly readings of terrestrial magnetism at Eskdalemuir Observatory and summaries of the results obtained in terrestrial magnetism, meteorology, and atmospheric electricity, chiefly from self-recording instruments at the observatories of the Meteorological Office. The work consists mainly of tabular matter. The mean daily variation of the various meteorological elements is given for each month and for the year for the five observatories, Aberdeen, Eskdalemuir, Cahirciveen (Valencia), Richmond (Kew), and Falmouth. C.G.S. units are used for meteorological data, with temperature in absolute degrees. The normal constant for absolute temperature given is 200°. With a normal constant of 273° the resulting values would be in ordinary degrees Centigrade, a system adopted by many meteorologists on the Continent and by some at home. To the uninitiated it gives a reading more easily comprehended, although in the British Isles very occasionally some of the values would be given with the negative sign. For terrestrial magnetism hourly observations are given for each month, with notes of the special features of the disturbances experienced. Notes are given at the end of the volume on the management of the magnetic and electrical instruments and on results of interest, showing the method of observation and the treatment in discussion.

IN two papers communicated to the Rumanian Academy of Sciences for 1920, G. G. Longinescu with G. P. Teodorescu and G. Chaborski respectively describes modified methods for the separation of the metals of the second group in qualitative analysis and of hydrochloric acid in the presence of hydrobromic and hydriodic acids. In the first, ammonium carbonate is used in the separation of the metals of the sub-group instead of ammonium sulphide. Caustic soda is used in the separation of the remaining metals. The separation of a bromide from the mixture with a chloride and iodide is effected by heating with alcohol and sulphuric acid. Hydrochloric acid is evolved, the hydrobromic acid decomposes into bromine which forms ethylene bromide, and the iodine remains principally in the liquid.

THE economics of ship propulsion are dealt with in a paper entitled "Coal, Oil, or Wind," read on December 14 before the Institution of Engineers and Shipbuilders in Scotland by Mr. C. O. Liljegren. So far as ships are concerned, wind only can be used to save fuel. Properly applied, this method of propulsion would mean an enormous saving in fuel and a reduction in the cost of carrying both passengers and freight. Sailing ships can be run at less cost per ton-year than any machine-driven vessel, whatever the price of fuel. The author has studied Sauerbeck's index, giving prices of forty-five commodities since 1800, together with the records of the prices of French wheat since 1250, and constructs some interesting curves. He is thus led to predict that all fuel will be too high in price for the profitable working of vessels for at least thirty years to come. The motor clipper appears to be the type of the immediate future, in which the auxiliary propulsion machinery would be used in calms only. The following figures are for the year 1913–14, and give the percentage earnings on investments with freight at 20*s.*:—Motor-ship, two-cycle, 26·0; motor-ship, four-cycle, 36·2; steamship, superheat, 38·5; and motor clipper, auxiliary sailing vessel, 70·2. Comparative figures for the year 1920 with freight at 55*s.* are as follows:—Motor-ship, four-cycle, 28·5; steamship, superheat, 25·5; motor clipper, 7150 tons, 56·0; and motor clipper, 11,600 tons, 63·0.

AMONG the forthcoming books announced by the Cambridge University Press we notice "Scientific Papers of Henry Cavendish," in 2 vols. Vol. i. (The Electrical Researches) is a reprint of the volume edited by Clerk Maxwell (1874–79), with additional notes by Sir Joseph Larmor. Some changes have been made in the arrangement of headlines, etc., and it is hoped that the revised volume will bring out more clearly both the extraordinary range and value of Cavendish's work and the magnitude and importance of the task which Clerk Maxwell accomplished in the last five years of his life. The volume also includes a reprint of the biographical sketch of Cavendish which Dr. T. Young contributed to the "Encyclopædia Britannica." Vol. ii. (Chemical and Dynamical), edited by Sir Edward Thorpe, includes the papers published in the Philosophical Transactions and much unpublished material from the papers in the possession of the Duke of Devonshire. It also contains an account of the researches in dynamics, astronomy, geology, and magnetism, in arranging which the editor has been assisted by Sir Joseph Larmor, Sir Archibald Geikie, Sir Frank Dyson, and Dr. C. Chree.

Our Astronomical Column.

PONS-WINNECKE'S COMET.—The failure to find this comet up to the present suggests that the date of perihelion may be later than those assumed. Ephemerides for April have therefore been prepared with the addition of a third assumed date, June 29·5. They are for Greenwich midnight:

T assumed June 13·5.

Date		R.A.	N. Decl.	Log *r*	Log Δ
		h. m. s.	° ′		
March	31	15 30 23	34 51	0·1519	9·7731
April	8	15 46 15	38 13	0·1306	9·7181
	16	16 4 49	41 27	0·1091	9·6600
	24	16 26 52	44 39	0·0879	9·5971
May	2	16 54 36	47 40	0·0670	9·5270

T assumed June 21·5.

Date		R.A.	N. Decl.	Log *r*	Log Δ
March	31	14 32 23	39 26	0·1729	9·8064
April	8	14 35 18	42 57	0·1519	9·7602
	16	14 36 45	46 20	0·1306	9·7135
	24	14 37 40	49 21	0·1091	9·6641
May	2	14 37 12	52 3	0·0879	9·6100

T assumed June 29·5.

Date		R.A.	N. Decl.	Log *r*	Log Δ
March	31	13 39 1	42 1	0·1932	9·8483
April	8	13 33 41	45 1	0·1729	9·8130
	16	13 24 58	47 28	0·1519	9·7789
	24	13 14 44	49 15	0·1306	9·7452
May	2	13 4 28	50 11	0 1091	9·7092

These three ephemerides define curves near which the comet should be found. Owing to its high north declination it is observable throughout the night.

COMET REID 1921*a*.—A third observation of this comet was obtained at Algiers on March 25. The following is the orbit deduced from this, combined with those of March 14 and 18:

$T = 1921$ May $10{\cdot}297$ G.M.T.
$\omega = 64^\circ\ 25'\ 24''$
$☊ = 268^\circ\ 28'\ 53''$
$i = 131^\circ\ 36'\ 42''$
$\log q = 0{\cdot}00582$

Ephemeris of Greenwich Midnight.

		R.A.	Decl.	Log *r*	Log Δ
		h. m. s.	° ′		
March	31	20 24 4	7 1 S.	0·0843	0·0928
April	8	20 28 51	2 23 N.	0·0596	0·0012
	16	20 34 40	17 2	0·0379	9·9007
	24	20 44 29	39 37	0·0206	9·8190
May	2	21 12 30	67 28 N.	0·0095	9·8127

The comet was observed on March 25 in bright moonlight. There is reason to expect that it will attain at least faint naked-eye visibility. The elements do not closely resemble those of any known comet.

LARGE DETONATING FIREBALL.—Mr. Denning writes:—"On March 16, 8h. 33m. G.M.T., a magnificent meteor was observed from Scotland and the north of England. It occasioned a brilliant illumination of sky and landscape, and was followed several minutes afterwards by loud detonations, which some of the observers likened to the bursting of high explosive shells. At Edinburgh the sound came in about 4 minutes after the meteor had passed, at Duns the interval was 2½ minutes, at Kelso 80 seconds, while at Berwick-on-Tweed the fireball's flash and sound of disruptive explosions were almost simultaneous. There seems to have been little doubt that the meteor may have fallen in or near the latter town, or in that part of the North Sea contiguous to it.

"A large number of observations were made of the object, but they are mostly of the popular type. It appears highly probable, however, that the meteor moved in a direction from south-west by west to north-east by east, and that its flight was from over Moffat to Berwick-on-Tweed. Its height was about 71 miles at the outset of its luminous career, and after traversing about 75 miles of its path it seems to have been about 24 miles high between Kelso and Coldstream, while at Berwick the meteor gave evidence of very near approach to the earth's surface. The fireball was a late Taurid from a radiant at 80°+22°, but it is rather difficult to fix with accuracy and certainty the point of radiation. The duration of the meteor's flight was about 6 seconds, and this would give a velocity of about 14 miles per second. Up to the time of writing no fragments of the meteor have been found, but they might easily have fallen into the sea unperceived."